

CLAIMS

What is claimed is:

1. A contrast agent, comprising:

5 a trimetallic nitride endohedral metallofullerene compound having a first atom with a first imaging contrast property and a second atom with a second imaging contrast property, wherein the first atom and the second atom are encapsulated within the fullerene cage of the endohedral metallofullerene.

10 2. The contrast agent of claim 1, wherein the first imaging contrast property and the second imaging contrast property are different.

3. The contrast agent of claim 1, wherein the first atom is lutetium.

15 4. The contrast agent of claim 1, wherein the first atom is lutetium and the second atom is a rare earth or group IIIB element.

20 5. The contrast agent of claim 1, wherein the first atom is lutetium and the second atom is yttrium, erbium, europium, holmium, gadolinium, terbium, dysprosium, or depleted uranium.

6. The contrast agent of claim 1, wherein the first atom is lutetium, yttrium, erbium, europium, holmium, gadolinium, terbium, dysprosium, or depleted uranium; and wherein the second atom is lutetium, yttrium, erbium, europium, holmium, gadolinium, terbium, dysprosium, or depleted uranium.

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7. The contrast agent of claim 1, wherein the first imaging contrast property is an x-ray absorption property for use in forming an image, and wherein the second imaging contrast property is a magnetic resonance imaging property.

5 8. The contrast agent of claim 1, wherein the fullerene cage is C₆₈, C₇₈, or C₈₀.

9. The contrast agent of claim 1, wherein the fullerene cage is C₈₀.

10 10. A contrast agent, comprising a compound having the formula:



wherein m is an even integer from about 60 to about 200.

11. A contrast agent, comprising:

15 a trimetallic nitride endohedral metallofullerene compound having a first atom with a first imaging contrast property encapsulated within a fullerene cage of the endohedral metallofullerene; and

a second trimetallic nitride endohedral metallofullerene compound having a second atom with a second imaging contrast property encapsulated within a fullerene cage of the endohedral metallofullerene.

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12. The contrast agent of claim 11, wherein the first imaging contrast property and the second imaging contrast property are different.

25 13. The contrast agent of claim 11, wherein the first atom is lutetium.

14. The contrast agent of claim 11, wherein the first atom is lutetium and the second atom is a rare earth or group IIIB element.

5 15. The contrast agent of claim 11, wherein the first atom is lutetium and the second atom is yttrium, erbium, europium, holmium, gadolinium, terbium, dysprosium, or depleted uranium.

10 16. The contrast agent of claim 11, wherein the first atom is lutetium, yttrium, erbium, europium, holmium, gadolinium, terbium, dysprosium, or depleted uranium; and wherein the second atom is lutetium, yttrium, erbium, europium, holmium, gadolinium, terbium, dysprosium, or depleted uranium.

15 17. The contrast agent of claim 11, wherein the first imaging contrast property is an x-ray absorption property for use in forming an image, and wherein and the second imaging contrast property is a magnetic resonance imaging property.

20 18. The contrast agent of claim 11, wherein the fullerene cage is C₆₈, C₇₈, or C₈₀.

19. The contrast agent of claim 11, wherein the fullerene cage is C₈₀.

20. A contrast imaging method, comprising the steps of:
administering an effective amount of a contrast agent to a subject, wherein the
25 contrast agent comprises a trimetallic endohedral metallofullerene compound having a

first atom with an imaging contrast property encapsulated in the fullerene cage of the endohedral metallofullerene; and

applying an imaging technique to the subject, wherein the imaging technique provides an image of a portion of a subject based on the imaging contrast property of the administered contrast agent.

21. The method of claim 20, wherein the imaging technique X-ray imaging, computerized axial tomography, or magnetic resonance imaging.

22. The method of claim 20, wherein the contrast agent further comprises: a second atom with a second imaging contrast property, wherein the first atom and the second atom are encapsulated within the fullerene cage of the endohedral metallofullerene.

23. The method of claim 22, wherein the first imaging contrast property and the second imaging contrast property are different.

24. The method of claim 20, wherein the first atom is lutetium.

25. The method of claim 22, wherein the first atom is lutetium and the second atom is a rare earth or group IIIB element.

26. The method of claim 22, wherein the first atom is lutetium and the second atom is yttrium, erbium, europium, holmium, gadolinium, terbium, dysprosium, or depleted uranium.

27. The method of claim 22, wherein the first atom is lutetium, yttrium, erbium, europium, holmium, gadolinium, terbium, dysprosium, or depleted uranium; and wherein the second atom is lutetium, yttrium, erbium, europium, holmium,
5 gadolinium, terbium, dysprosium, or depleted uranium.

28. The method of claim 22, wherein the first imaging contrast property is an x-ray absorption property for use in forming an image, and wherein the second imaging contrast property is a magnetic resonance imaging property.

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29. The method of claim 20, wherein the contrast agent further comprises:
a second trimetallic nitride endohedral metallofullerene compound having a second atom with a second imaging contrast property encapsulated within a fullerene cage of the endohedral metallofullerene.

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30. The method of claim 29, wherein the first imaging contrast property and the second imaging contrast property are different.

31. The method of claim 29, wherein the first atom is lutetium, yttrium,
20 erbium, europium, holmium, gadolinium, terbium, dysprosium, or depleted uranium; and wherein the second atom is lutetium, yttrium, erbium, europium, holmium, gadolinium, terbium, dysprosium, or depleted uranium.

32. The method of claim 29, wherein the first imaging contrast property is an x-ray absorption property for use in forming an image, and wherein the second imaging contrast property is a magnetic resonance imaging property.